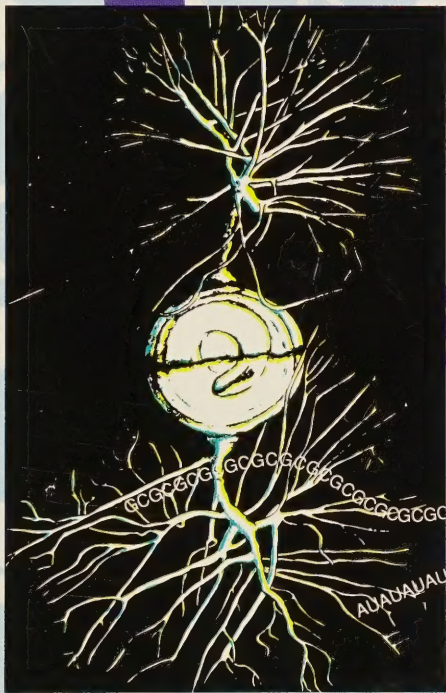


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Biotechnology at USDA

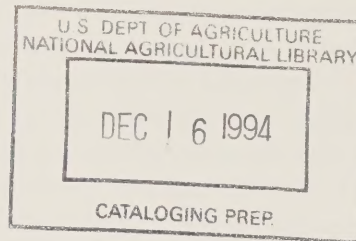


United States
Department of
Agriculture



National Agricultural Library

Biotechnology at USDA

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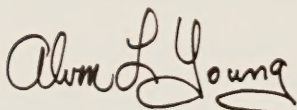
Foreword

Recent advances in the biological sciences, particularly in molecular biology, have led to exciting possibilities for the genetic modification of plants, animals, and microbes, with potential applications in agriculture. These exciting discoveries have come to be called biotechnology.

It is the responsibility of the U.S. Department of Agriculture (USDA) to ensure that agricultural research and the development of biotechnology are safe for agricultural production systems, human health, and the environment, and that products of agricultural biotechnology are safe and effective for their intended use.

To achieve these goals, 11 USDA agencies and offices are pursuing programs and policies that will impact the future of agricultural biotechnology. This brochure provides an overview to USDA's biotechnology organization and the diverse, yet interrelated, activities now going on in the Department.

This brochure was prepared by the USDA Office of Agricultural Biotechnology (OAB), which is responsible for coordinating biotechnology programs and activities within USDA. The OAB acknowledges the cooperation and assistance of each of the agencies as well as the USDA Office of Public Affairs in gathering information for this brochure.



Alvin L. Young
Director
Office of Agricultural Biotechnology
December 1990

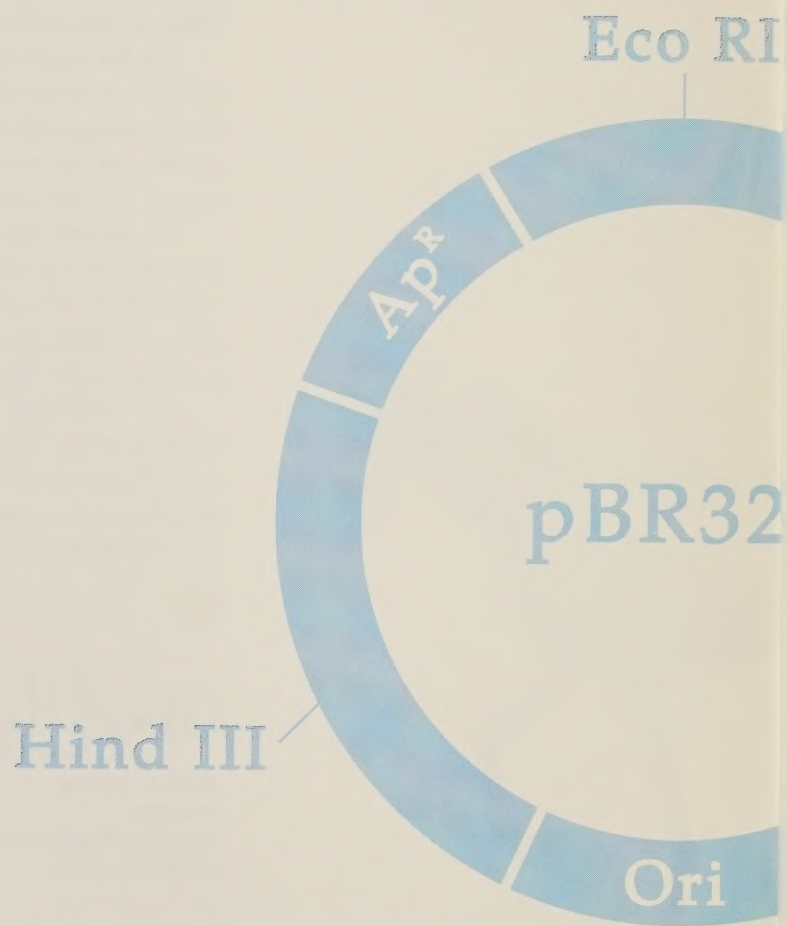
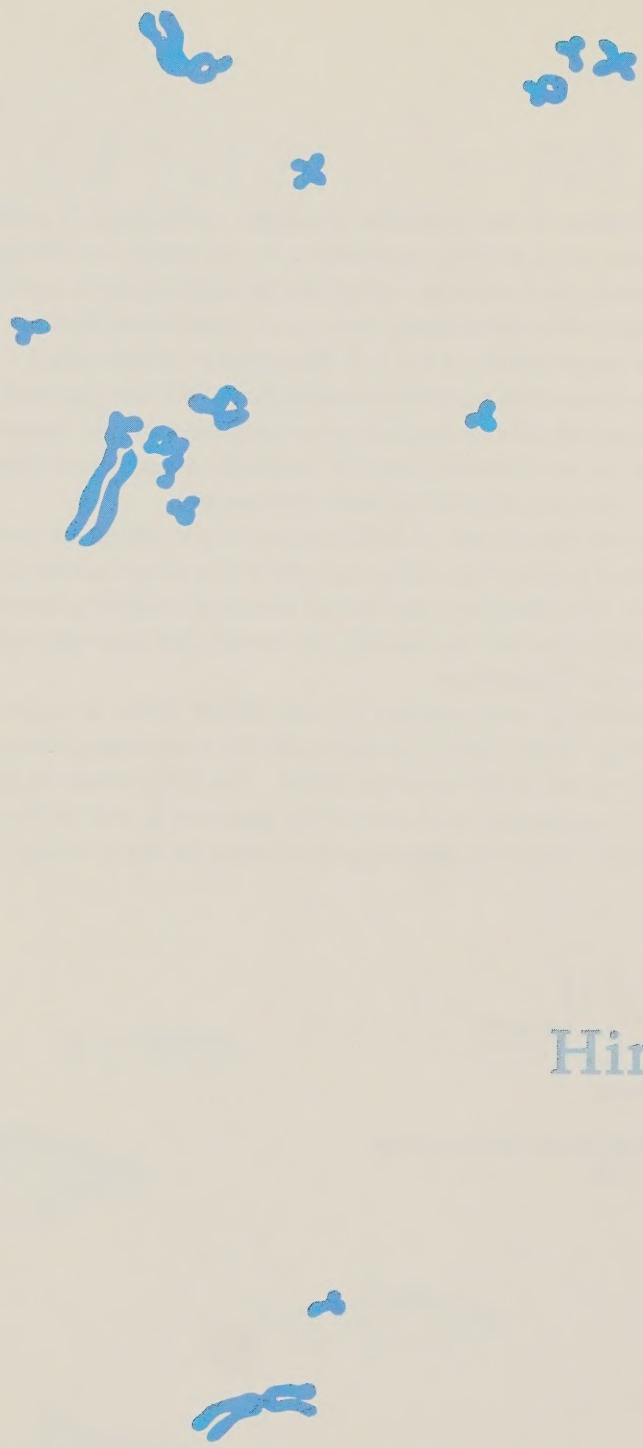
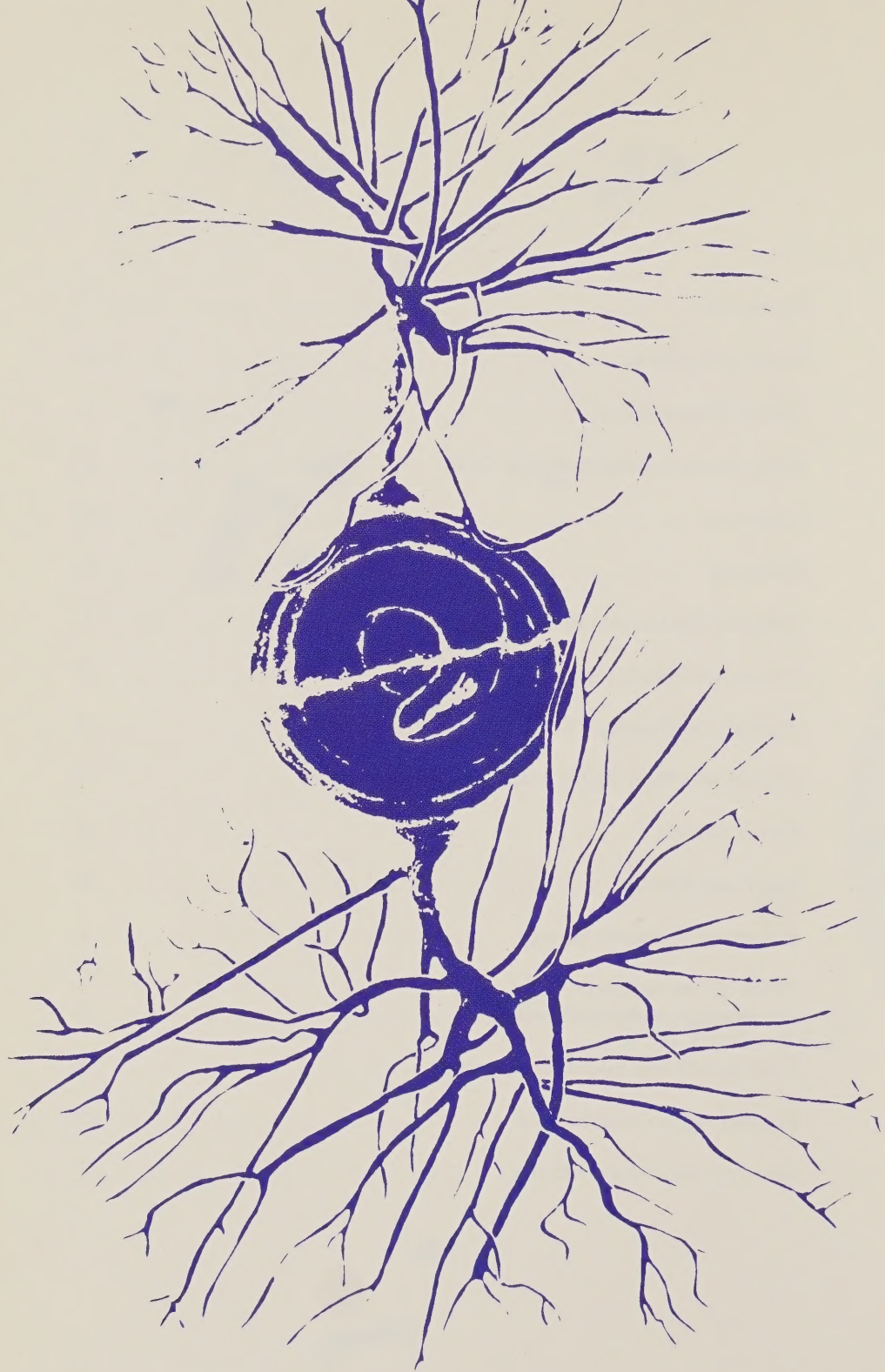


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List of Abbreviations

ABRAC
Agricultural Biotechnology Research Advisory Committee

AGRICOLA
Agricultural On-Line Access

AMS
Agricultural Marketing Service

APHIS
Animal and Plant Health Inspection Service

ARS
Agricultural Research Service

BIC
Biotechnology Information Center

BGH
Bovine growth hormone

BST
Bovine somatotropin

CBA
Committee on Biotechnology in Agriculture

CFSAN
Center for Food Safety and Applied Nutrition

CRIS
Current Research Information System

CSRS
Cooperative State Research Service

CVM
Center for Veterinary Medicine

EPA
Environmental Protection Agency

ERS
Economic Research Service

ES
Extension Service

FAO
Food and Agriculture Organization

FAS
Foreign Agricultural Service

FDA
Food and Drug Administration

FS
Forest Service

FSIS
Food Safety Inspection Service

GATT
General Agreement on Tariffs and Trade

IA&CP
International Affairs and Commodity Programs

M&IS
Marketing and Inspection Service

NAL
National Agricultural Library

NBIAP
National Biological Impact Assessment Program

NIH-RAC
National Institutes of Health-Recombinant DNA Advisory Committee

NR&E
Natural Resources and Environment

OAB
Office of Agricultural Biotechnology

OI
Office of Information

OICD
Office of International Cooperation and Development

OIG
Office of the Inspector General

OPA
Office of Public Affairs

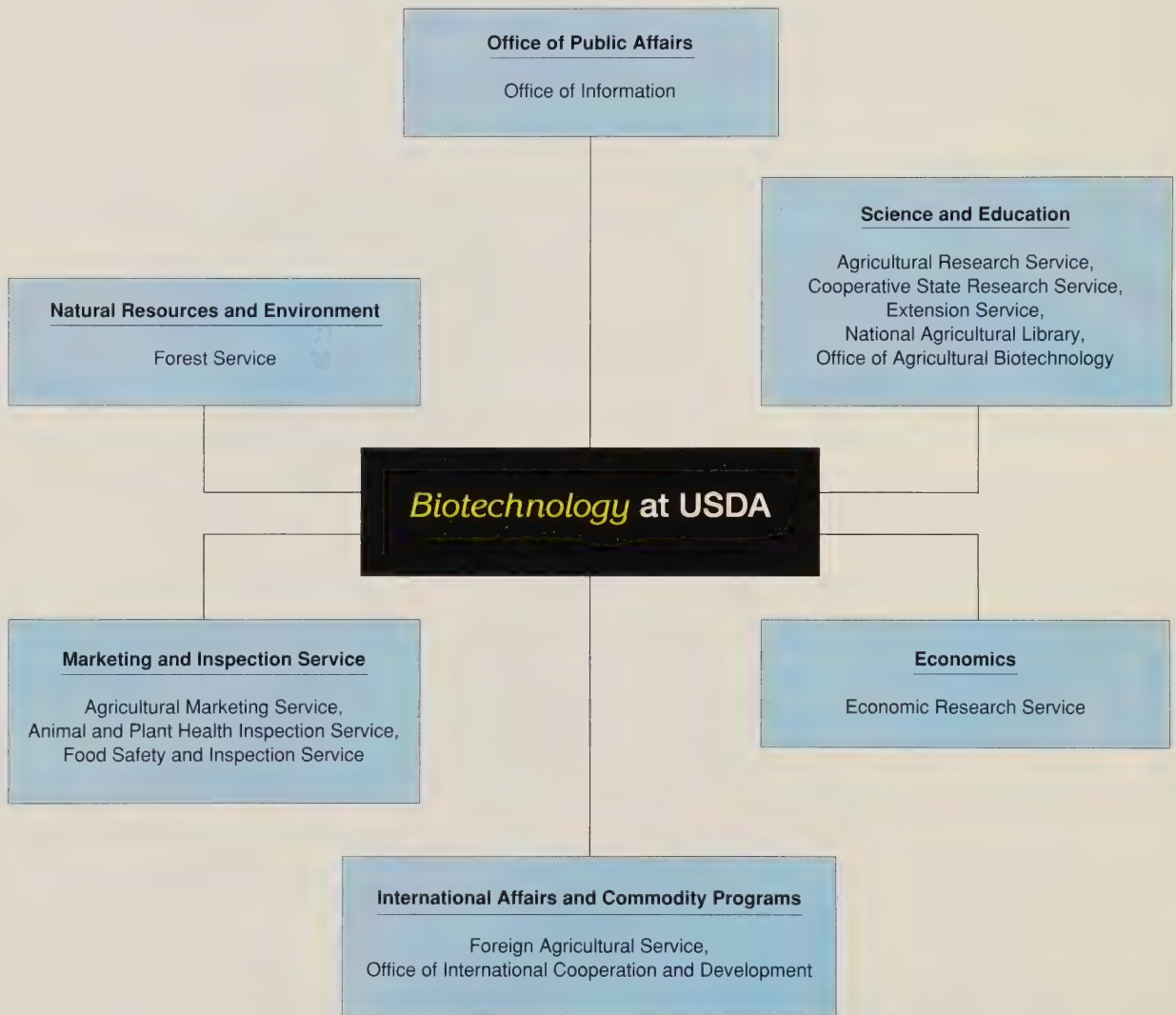
S&E
Science and Education

TEKTRAN
Technology Transfer Automated Retrieval System

USAID
United States Agency for International Development

USDA
United States Department of Agriculture

Biotechnology Organizational Chart



Summary

Biotechnology Defined

Agricultural biotechnology is a collection of laboratory techniques, such as genetic engineering, used by scientists to improve plants, animals, and microorganisms. Employing biotechnology, researchers have produced virus-resistant varieties of cucumbers, tomatoes, and potatoes; better vaccines and diagnostic kits used for horses, chickens, and swine; and even new and improved varieties of commercial flowers.

Agency Roles

USDA plays a number of roles in agricultural biotechnology, supporting and encouraging various initiatives and ensuring biotechnology is developed safely. To help fulfill the objectives, 11 agencies participate in biotechnology activities—the Agricultural Research Service, Cooperative State Research Service, Forest Service, Cooperative Extension Service, Animal and Plant Health Inspection Service, Food Safety and Inspection Service, Agricultural Marketing Service, Economic Research Service, National Agricultural Library, Office of International Cooperation and Development, and Foreign Agricultural Service.

The Office of Agricultural Biotechnology (OAB) coordinates the diverse biotechnology-related programs and activities conducted by these agencies. The OAB also supports the Committee on Biotechnology in Agriculture, which provides a policy review mechanism for USDA. In addition, it is OAB's responsibility to manage and support USDA's Agricultural Biotechnology Research Advisory Committee, which consists of more than a dozen experts in biotechnology who review the safety of certain research proposals.

Putting Safety First

Scientists conduct field tests only after they have completed years of research in a laboratory, usually followed by more research in a greenhouse. Because safety of people and of the environment is a top priority at USDA, strict regulations and guidelines must be followed before certain organisms or products can be tested outside. The Animal and Plant Health Inspection Service (APHIS) manages and enforces these regulations. APHIS requires individuals to obtain a permit to conduct field tests. Since 1987 when the regulations went into effect, APHIS has issued more than 100 of these permits.

Another safety mechanism at USDA is a set of guidelines USDA research agencies will use to help assess biosafety and risk prior to the approval of a field test. These guidelines are now in the final stage of clearance and should appear soon in the Federal Register for public comment.

The National Biological Impact Assessment Program (NBIAP), established under the Cooperative State Research Service, features an electronic bulletin board with 14 databases that contain the latest information on safety, research, field tests, and regulations. It is easily accessible through a toll-free phone number. NBIAP also has a permit application generator which uses artificial intelligence to assist principal investigators in the design of safe field tests with plants, animals, and microbes.

Research Programs and Other Projects

USDA strongly supports basic and applied research in biotechnology, allocating \$110 million for the effort in fiscal 1990. The Agricultural Research Service (ARS) is USDA's principal research agency. ARS is using biotechnology to reduce and eliminate the effects of pollutants in soil and water; to develop crops that adapt to drought, cold, heat, and toxic soil minerals; to enhance the effectiveness of beneficial insects; and to improve the safety and quality of processed and unprocessed foods.

USDA's Cooperative State Research Service (CSRS) also supports research programs that use the new tools of biotechnology. For example, CSRS is using a technique called "cell fusion" to produce a potato that resists various diseases. With the potato industry registering losses of \$100-\$200 million annually over the last 10 years due to diseases, such research has high priority.

At the Forest Service, scientists are hot on the trail of the gypsy moth, using biotechnology to put together a complex system of genetic messages that would instruct the young larvae to stop growing and reproducing.

Other USDA agencies are involved in projects that include understanding the socio-economic impacts of the new technology, planning for the smooth transfer of the technology to affected groups, and developing international exchanges and standards of safety.

[illegible]

Overview

Who Does What?

Eleven USDA agencies play a role in biotechnology research, regulation, education, commercialization, and international activities. The following chart identifies the major biotechnology activity for each of these agencies.

Research	Regulation	Education	Commercialization
ARS	APHIS	ES	ARS
CSRS	FSIS	NAL	AMS
FS	AMS		
ERS			
International			
OICD			
FAS			

Are There any Long-Term Biotechnology Programs at USDA?

There are three such programs that specifically relate to biotechnology:

- The Plant Genome Mapping Program was created in 1989 with three major objectives: to map and sequence the plant genome, including technology and development; to manage databases, information, and resources; and to identify, characterize, and express genes of agricultural importance, as well as gene transfer technology. The plant genome office also addresses social issues associated with genome research.

- The National Biological Impact Assessment Program (NBIAP) is carried out by the CSRS and is chiefly concerned with biosafety monitoring and research that build on the broad base of experience and scientific knowledge of the agricultural research

community. NBIAP is designed to obtain knowledge for predicting the potential impact of biotechnology products in field tests or commercial development. In addition to monitoring, the program focuses on documentation and research on the development of predictive models.

- The Technology Transfer Program is carried out by the ARS and is responsible for translating inventions into practical products. Since 1986 when the Technology Transfer Act went into effect, ARS scientists have signed 127 cooperative research and development agreements with commercial firms to develop products. About half of these were for products or processes developed through biotechnology.

Are There Any Databases I Can Access?

The following databases provide up-to-date information on biotechnology and related activities:

- Technology Transfer Automated Retrieval System (TEKTRAN) — Over 10,000 brief, easy-to-read summaries of the latest research results on genetic engineering, biological control of pests, and other fields are stored in TEKTRAN. The service is provided by the ARS. For details call 301-344-4045.

- Current Research Information System (CRIS)— The CRIS is another database that includes ongoing agricultural research projects at least partly funded by the Federal Government. For details call 301-344-3846.

- **Agricultural On-Line Access (AGRICOLA)** — This is a bibliographic database of the NAL that covers worldwide journal literature and monographs on topics related to agriculture. For details call 301-344-3813.

- **The National Biological Impact Assessment Program (NBIAP) Bulletin Board** — This new computerized source of information on agricultural and environmental biotechnology is a service of the CSRS and the Virginia Polytechnic Institute and State University. It combines news on recent developments with direct access to 14 databases. Topics range from complete texts of Federal regulations to sources of information on specific organisms. For details call CSRS at 202-401-5741.

How Does it all Fit Together?

Several USDA committees and offices help to link the many biotechnology-related activities carried out by USDA. These committees and offices often spearhead those changes in policy that help the Department maintain a leadership position, as well as a technological edge, in biotechnology research, regulation, development, education, and commercialization. These committees and offices include:

- **The Committee on Biotechnology in Agriculture (CBA)** — The CBA was created in 1986 to provide an opportunity for interagency science policy coordination, guidance, and information exchange on all aspects of agricultural biotechnology. The CBA is co-chaired by the Assistant Secretary for Marketing and Inspection Services and the Assistant Secretary for Science and Education. The Director of the OAB serves as Executive Secretary. CBA members include administrators of the ARS, APHIS, ERS, FSIS, CSRS, and FS.

- **The Biotechnology Council** — The Biotechnology Council is a subcommittee of the CBA and was formed in 1990. Members include representatives of the agencies that serve on the CBA, as well as others in senior level positions. The Council provides a forum for exchanging information and, at the request of CBA, for developing recommendations concerning biotechnology activities.

- **The Office of Agricultural Biotechnology (OAB)** — The OAB coordinates biotechnology programs and activities throughout the USDA, develops review procedures where needed, assists in developing research guidelines, and provides staff support for biotechnology committees. The OAB also tracks and monitors biotechnology policies in foreign countries and issues the publication *Biotechnology Notes*.

- **The Agricultural Biotechnology Research Advisory Committee (ABRAC)** — The ABRAC is the major committee supported by the OAB. ABRAC members provide the USDA scientific advice related to biotechnology research. It was created in 1987 and modeled after the NIH's DNA Recombinant Advisory Committee (RAC). ABRAC members have expertise in the use of recombinant DNA research in plants, animals, and microbes; ecology/environmental science; agricultural production practices; biological containment and field releases; ethics; laws and regulations; public health; and epidemiology.



The Office of Agricultural Biotechnology

The United States Department of Agriculture's (USDA) Office of Agricultural Biotechnology (OAB) was established in 1986 under the Assistant Secretary for Science and Education to assure coordination of all USDA biotechnology activities.

The OAB coordinates biotechnology activities within USDA; provides leadership for the development and review of research guidelines; provides handbooks for field testing and guidelines for international scientific exchange; provides staff support to USDA committees dealing with the various aspects of biotechnology; provides staff support and staff action on biotechnology issues for the Assistant Secretary as appropriate; maintains information registries concerning agricultural biotechnology; and promotes coordination of information and updates on biotechnology through outreach activities including wide-spread distribution of *Biotechnology Notes*, a monthly award-winning news publication; public meetings and scientific symposia; video and tele-

conference programs; and special media events, press releases, and background materials.

OAB established the Agricultural Biotechnology Research Advisory Committee (ABRAC), modeled in part after the National Institutes of Health Recombinant DNA Advisory Committee (NIH- RAC). The ABRAC provides a scientific basis for the safety review of agricultural research funded by USDA and involving genetically modified organisms.

USDA has also established the National Biological Impact Assessment Program (NBIAP) to support and facilitate the safe testing of genetically engineered organisms and to better assure compliance with Federal regulations and guidelines.

- For additional information contact Marti Asner, USDA, OAB, Room 1001, Rosslyn Plaza East, 14th and Independence Avenue, SW, Washington, DC, 20250-2200; or phone 703-235-4419.

ABRAC meetings are held about four times a year. Members discuss biotech research issues and make their recommendations to USDA.



The Cooperative State Research Service

The Cooperative State Research Service (CSRS) and its university research partners recognize biotechnology and genetic engineering as an important new system of technology to be applied in exciting new ways. Benefits to be derived from agricultural biotechnology research are expected in several areas including increased competitiveness for U.S. agricultural products in world markets, improved U.S. farm profitability, and a more sustainable agricultural production system.

Considerable resources are being invested in biotechnology research through CSRS as direct institutional support, special research grants for specific research projects, and competitive research grants. CSRS base or "partnership" funding to the university-based agricultural research system through the Hatch Act, McIntire-Stennis Cooperative Forestry Act, Evans-Allen Act, and Animal Health and Disease Research Act has exceeded \$14 million a year for each of the past 3 years. During the same

period, CSRS competitive and special grants biotechnology funding exceeded \$30 million per year.

With these funding sources, cooperating institutions conduct both basic and applied biotechnology research on plants, animals, and microbes in broad areas of study including bioprocessing of agricultural products for improved value and market diversification; genetic modification of agricultural organisms for better resistance to stresses, improved quality, and other traits; improved diagnostic techniques to more accurately identify plant and animal pathogens; and safer and more effective vaccines.

As biotechnology moves from contained laboratory research to field trials, proper methods are needed to assure the safety of the tests with genetically modified organisms. Thus, the CSRS established the National Biological Impact Assessment Program (NBIAP) to facilitate safe field testing through biosafety information exchange, to encourage development of biological monitoring techniques, and to foster biosafety research.

The NBIAP information network includes an electronic bulletin board allowing access to 14 databases on such topics as Federal biosafety rules and regulations and current biotechnology literature. The information is readily available to researchers in the public and private sectors to help assure compliance with regulations and guidelines and to provide the most up-to-date information on biosafety. The network also offers access to a knowledge-based system to help investigators understand the "Federal Coordinated Framework for the Regulation of Biotechnology" and to assist them in preparing applications to various Federal authorities with responsibilities for biotechnology oversight. NBIAP also provides liaison to the USDA Office of Agricultural Biotechnology to foster and support safe field testing of genetically modified organisms.

- For further information contact Office of the Administrator, CSRS; or phone 202-447-4423.



These transgenic mirror carp contain a growth hormone gene from rainbow trout. The gene enables the carp to reach full size in less time than normal. The research was conducted at Auburn University, Auburn, Alabama.

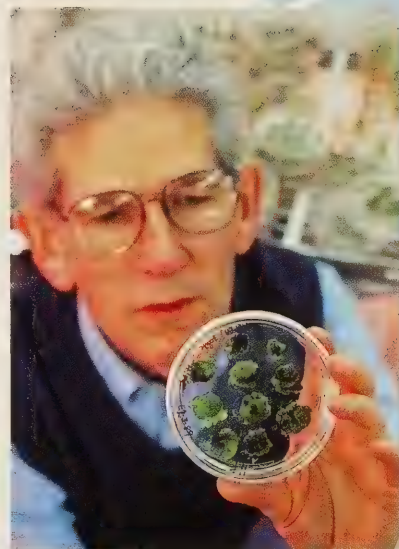
The Agricultural Research Service

The Agricultural Research Service (ARS) has many projects identifying genes that control specific desirable traits such as resistance to disease or insects, cold hardiness, and drought tolerance. Crop and animal products can be made more nutritious and of higher quality. Genetic engineering can also help trim the farmer's production costs.

The ARS 1990 budget includes \$59.5 million for research in biotechnology. At least 185 ARS scientists are working on 165 projects at laboratories throughout the country. In 1984, a new Plant Gene Expression Center was opened at the Western Research Center in Albany, California. In 1985, the ARS Beltsville Agricultural Research Center in Beltsville, Maryland, announced new strategies to intensify biotechnology endeavors. And in 1989 a new Plant Molecular Biology Laboratory was opened at the Beltsville center.

In January 1990, ARS published a book, "Solving Agricultural Problems With Biotechnology," which describes ongoing research programs and recent accomplishments. Examples of biotechnology research include:

- The use of monoclonal antibodies, a technique that fuses short-lived antibody cells with a rapidly multiplying cancer cell. The resulting hybrid, with traits from both cells, is used to produce diagnostic and therapeutic agents.
- A new diagnostic probe capable of detecting at least 35 distinct plant diseases, some of which can lower the market value of a vegetable or ornamental by 75 percent, which is now on the market.
- Tissue culture takes tiny bits of tissue from a single plant to grow in test tubes and then the individual cells are regenerated into many whole plants. Vigorous, pathogen-free peach trees are being raised through tissue culture propagation including the first that are resistant to leaf spot.



ARS plant physiologist Lowell Owens peers into a petri dish containing sugar beet leaf tissue that is being genetically modified by being treated with bacteria that transfer genes to plant cells. Photo by Keith Weller.

- Genetic engineering, in which plant, animal, and bacterial genes are dissected, spliced, rearranged, removed, and transferred from one organism to another, opens the way for quickly adding specific traits that are needed to improve production. A foreign gene has been successfully transplanted into walnut embryos. These embryos took up the experimental gene and produced plants that contain the active gene.

In 1989, the Secretary of Agriculture announced the Plant Genome Mapping Program—a major research effort to identify the most important genes in the major food and forest crops and to determine what the genes do and how they function. ARS coordinates the project, acting as a focal point for Federal, State, and university research on plant genomes.

- For further information contact Bob Norton, USDA, ARS, Beltsville, MD 20705; or phone 301-344-2264.

The Animal and Plant Health Inspection Service

The Animal and Plant Health Inspection Service (APHIS) has broad authority to protect the Nation's animal and plant health and to coordinate biotechnology regulatory activities for USDA as a whole. APHIS, by combining existing staffs, established the Biotechnology, Biologics, and Environmental Protection Unit in October 1988, to coordinate USDA biotechnology regulation, to regulate veterinary biologics, and to assure that all product reviews and program activities conform with legislation designed to protect the environment.

Although some of the technology is new, concerns about threats to the Nation's agriculture are not. The 1912 Plant Quarantine Act and the 1957 Federal Plant Pest Act authorized the USDA to combat new plant pests and to regulate their possible introductions. Congress passed the Virus-Serum-Toxin Act in 1913 to assure that veterinary biological products are pure, safe, potent, and efficacious.

Veterinary biological products, those that diagnose, prevent, or treat animal diseases, are evaluated on a case-by-case basis. APHIS uses the same stringent standards for licensing these products whether they are genetically engineered or conventionally produced. As of October 1990, APHIS has licensed 46 veterinary biologics that were manu-

factured by products of biotechnology. Forty-two of these products have active licenses; five of the licenses are for live virus pseudorabies vaccines. A field test of a genetically engineered rabies vaccine was also approved and began in August 1990.

APHIS reviews and issues permits for field testing or interstate shipment of genetically engineered plants and microorganisms that might introduce a plant pest into the environment. The organism will fall under APHIS jurisdiction if the donor, recipient, or vector used to engineer it meets the APHIS definition of a plant pest. As of October 1990, APHIS granted 101 permits.

Other agencies that hold regulatory authority over genetically engineered products include the Environmental Protection Agency and the Food and Drug Administration. APHIS coordinates its efforts with these groups to prevent unnecessary duplication.

- For further information contact USDA, APHIS, Room 610 Federal Building, 6505 Belcrest Road, Hyattsville, MD 20782; or phone 301-436-7601.



Genetic engineering techniques are proving increasingly useful to manufacturers of veterinary biologics--products that diagnose, prevent, and treat animal diseases. APHIS uses the same strict standards in licensing these, whether they are genetically engineered or conventionally developed, to ensure safety, efficacy, and purity of product.



The Forest Service

The USDA's Forest Service is currently developing and testing basic techniques to employ biotechnology in accelerating tree growth and improving the quality of trees. Developments are also being made in disease resistance mechanisms, natural biological control agents, and the development of new and efficient industrial processes for wood use.

Research on techniques for accelerating tree development is being conducted at Forest Service laboratories at the Pacific Southwest Forest & Range Experiment Station, Berkeley, California; the Forestry Sciences Laboratory at Rhinelander, Wisconsin; and the Forestry Sciences Laboratory at Gulfport, Mississippi. Disease resistance research is being carried out at the North Central Forest Experiment Station, St. Paul, Minnesota; and research on improving biological control agents is being conducted at the Forestry Sciences Laboratory at Delaware, Ohio.

Biotechnology studies related to forest products improvement are being led by scientists at the Forest Products Laboratory at Madison, Wisconsin. New research has been initiated on the mapping of the pine genome. This program is now underway at the Berkeley and Gulfport laboratories.

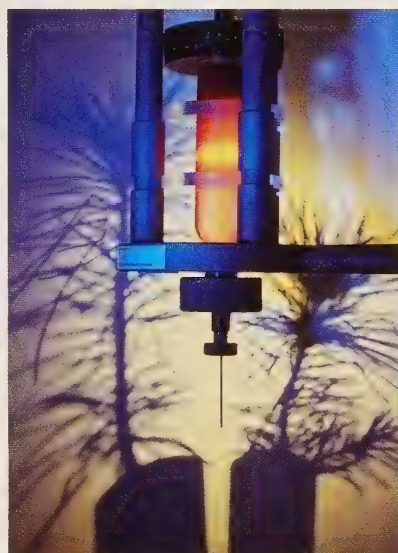
An array of techniques has been developed and tested that can be successfully applied to woody plants. It is now possible to identify, isolate, and transfer certain genes in woody plants. In fact, the first genetically engineered tree has been developed by the Forestry Sciences Laboratory at Rhinelander. In this case a gene for herbicide resistance was placed in a hybrid poplar.

Other research has demonstrated that a functional level of disease resistance can be achieved by screening small tissue segments. Resistance of poplar trees to a common leaf disease has been found using this technique, and the plants are now being field tested at the St. Paul facility.

These research activities in biological engineering are opening doors to rewards for this and future

generations— extension and protection of our forest resources, fast growing trees of high quality, and even trees genetically designed with specific properties for specific uses.

- For further information contact the Forest Service Public Affairs Office, P.O. Box 96090, Washington, DC 20090; or phone 202-447-3760.



As part of a Forest Service experiment at the Pacific Southwest Forest and Range Experiment Station in Berkeley, CA, scientists are isolating the genetic material (DNA) in pine trees. The DNA is shown as a white band in the centrifuge tube located above the needle in this photo. According to Forest Service geneticist David Neale, the experiment is helping scientists understand the genetic makeup of pine so that they can ultimately improve upon them. Photo by Paul Hodgkiss.

The Extension Service

The Cooperative Extension System is a national educational network which links science and technology to the needs of the people where they live and work. Extension's purpose is education-- practical education for Americans to use in dealing with the critical issues that impact their lives and the Nation's future.

The Cooperative Extension system combines the expertise and resources of Federal, State, and local governments. The partners in this unique system include the Extension Service at USDA, extension professionals at the 1862 land-grant universities in the 50 States, Puerto Rico, the Virgin Islands, Guam, the Northern Marianas, American Samoa, Micronesia, and the District of Columbia; and at 16 1890 land-grant universities and Tuskegee University, as well as extension professionals in nearly all of the Nation's 3,150 counties.

In addition to these partners in the system, thousands of paraprofessionals and nearly 3 million volunteers support this partnership. Strong linkages with other public and private groups are also crucial

components of the Cooperative Extension System's educational efforts.

The Cooperative Extension System ensures that the agricultural community receives information and education relating to how products and systems developed in concert with biotechnology can be applied in existing systems. Extension focuses on the products and systems developed through biotechnology which can enhance the profitability and global competitiveness of American agriculture, improve environmental quality, and maintain the safety and quality of the food supply.

In addition, the Cooperative Extension System works to ensure that the public is informed about regulations and evaluation systems used to verify the safety of products that result from biotechnological advances.

- For further information contact Gary Weber, USDA South Agriculture Building, Room 3334, Washington, DC 20250; or phone 202-447-2677.



The Cooperative Extension System ensures the agricultural community is kept abreast of new developments in biotechnology.

The Economic Research Service

The technology responsibilities of the Economic Research Service (ERS) involve analysis of the potential for new technologies to affect agricultural policies, commodity production, and trade; financial impacts on the farm sector and rural economies; and agricultural resource utilization. These responsibilities also include analysis of the economic aspects of policies that develop, regulate, and encourage the adoption of new technology, and the impact of these policies on agricultural productivity.

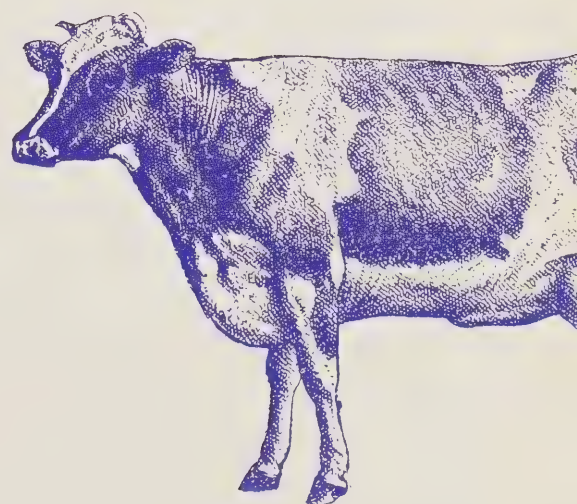
The agency has given biotechnology special attention because of its potential for having a major impact on U.S. agriculture in the future. ERS has conducted significant amount of research investigating the potential impacts of biotechnology, and especially the impacts of animal growth hormones on the livestock sector. Biotechnology issues fit within the agency's broader technology program. ERS has done or has ongoing studies examining:

- Bovine somatotropin (BST), also called bovine growth hormone (BGH), and its effects on the dairy industry including analysis of national, regional, and farm-level impacts.
- The adoption of livestock growth hormones by the dairy, beef, and hog sectors of the livestock industry addressing the potential impacts of growth hormone technology on feed grain demand, land use, farm income, international competitiveness, and food safety.
- Consumer effects of biotechnology describing the range of current developments in the livestock, crops, and food processing sectors, and the potential for these changes to affect food prices and product quality. The study also considers issues regarding the regulation of biotechnology.
- Economic aspects of the regulation of biotechnology. Major issues include food safety and con-

sumer acceptance of biotechnology products, the regulation of biotechnology processes, and the risk of deliberate release into the environment of organisms created by biotechnology processes.

- Biotechnology in a global context with emphasis on technology development and international technology transfer, and the adequacy of the global food supply.

- For further information contact the ERS, Resources and Technology Division, 1301 New York Avenue, NW, Washington, DC 20250-4788; or phone 202-219-0504.



The Office of International Cooperation and Development

USDA's Office of International Cooperation and Development (OICD) promotes U.S. agriculture and advances the agriculture of developing countries as part of a complementary global agricultural system capable of providing ample food and fiber for all people. To accomplish this mission, OICD works with the total USDA, other Federal agencies, and U.S. universities. USDA policies and the USDA perspective are incorporated into the programs of international agricultural cooperation and development.

OICD is involved internationally in biotechnology in a variety of ways, with emphasis on short-term scientific and technical exchanges and longer term collaborative research projects of mutual benefit to the United States and participating countries.

The Scientific and Technical Cooperation program of OICD promotes international cooperation in biotechnology through sponsorship of short-term (1-6 weeks) exchange visits of U.S. and foreign scientists. Each year OICD negotiates a program of activities with each cooperating country, based on proposals submitted by U.S. and foreign countries. Biotechnology is increasingly one of the most frequent topics of exchange visits. The majority of biotechnology exchange visits are with European countries and the Soviet Union.

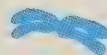
The Collaborative Research Program of OICD commits funds to support longer term (1-3 years) research efforts by U.S. scientists in approved projects involving institutions of other nations. Proposal topics are always consistent with U.S. research priorities. OICD is involved in a number of long-term collaborative biotechnology research projects with other countries. Worldwide, U.S. scientists are studying ways to use biotechnology to increase food production while protecting the environment, to improve food safety and storage life, and to control diseases and pests.

In addition to those activities, OICD recently implemented, with U.S. Agency for International Development (USAID) funding, a workshop entitled

"Strengthening Collaboration in Biotechnology: International Agricultural Research and the Private Sector." The workshop attracted several hundred people from all over the world and provided a framework for them to develop collaborative research projects between research centers in developing countries and private companies in industrialized countries, primarily the United States.

OICD, through its International Organizational Affairs Division, also serves on governing bodies of the Food and Agriculture Organization (FAO) of the United Nations, which deal with biotechnology. Based on contacts with other USDA agencies, OICD gives guidance, formally and informally, to FAO on issues in biotechnology.

- For more information on these activities, contact: Office of the Administrator; USDA/OICD; McGregor Building; Washington, DC 20250-4300; or phone 202-653-9309.



The Food Safety and Inspection Service

The Food Safety and Inspection Service (FSIS) assures the safety, wholesomeness, and truthful labeling of meat and poultry and meat and poultry products. FSIS inspectors are stationed in nearly 7,000 plants throughout the United States. The agency annually inspects approximately 120 million head of livestock, 5.6 billion birds, and 150 billion pounds of processed products such as sausage, potpies, and ham.

Biotechnology provides new mechanisms for the production of animals that are disease resistant, leaner, or possessing other desirable characteristics. Biotechnology is also used to produce genetic probes for the detection and identification of harmful bacteria in meat and poultry products.

Biotechnology offers a precise and predictable means of developing products with desired characteristics. For example, animals with desirable traits can be produced by exact genetic changes rather than by relying on traditional breeding, which results in a random selection of animals with desirable traits but with totally unknown genetic modifications. FSIS is working to ensure products from these animals will be safe for human consumption and is developing criteria for ensuring food safety.

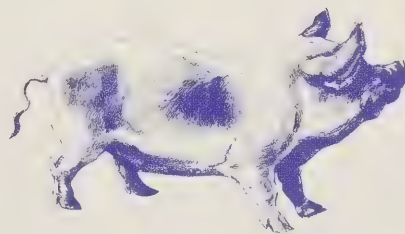
FSIS has the authority to regulate meat and poultry under the Federal Meat Inspection Act, the Poultry Products Inspection Act, and the corresponding regulations (9 CFR 301-390.8).

Animal products of biotechnology are regulated in conjunction with the Animal and Plant Health Inspection Service (APHIS), the Environmental Protection Agency (EPA), the Center for Food Safety and Applied Nutrition (CFSAN), and the Center for Veterinary Medicine (CVM) of the Food and Drug Administration (FDA). For example, transgenic animals would not be presented for inspection unless APHIS and EPA agreed the animals could be released from containment. Pharmacologically active gene products would be regulated in conjunction with EPA. Proteins with other special properties

would be regulated in conjunction with CFSAN, as additives, constituents, or as Generally Recognized As Safe products.

FSIS participates in the Food Animal Biotechnology Information Exchange Group, which consists of FSIS, APHIS, CVM, CFSAN, and EPA. The group meets periodically to coordinate interagency regulation of food animal products of biotechnology and to exchange food safety and other information.

- For additional information contact Denise Clarke, FSIS/USDA, South Building, Washington, DC 20250; or phone 202-447-7608.



The Foreign Agricultural Service

USDA's Foreign Agricultural Service (FAS) represents U.S. agricultural interests overseas, reports on agricultural production and trade in foreign countries, promotes exports of U.S. farm products, and works to improve world trading conditions.

FAS also coordinates USDA's role in international food aid programs and administers some agricultural import regulations. FAS operates worldwide with personnel located in more than 80 posts covering more than 100 countries. Its overseas staff is backed up by a team of analysts, negotiators, and marketing specialists located in Washington, DC.

FAS's role in USDA biotechnology activities is in monitoring the policy aspects of worldwide developments in biotechnology to ensure that U.S. products created through biotechnology techniques do not face unfair trade practices or infringement on intellectual property rights.

FAS participates in several forums with other USDA agencies and other U.S. Government departments to ensure a continuing dialogue on biotechnology, related regulatory information, testing and certification issues, veterinary medicines, and the commercial applications of biotechnology. When U.S. trade interests are at stake, FAS attempts to resolve disputes through either bilateral or multilateral trade negotiations.

FAS coordinates USDA participation in negotiations of the General Agreement on Tariffs and Trade (GATT). An important U.S. objective in the current agricultural negotiations of GATT is improved trade rules concerning health-related regulations. New rules would impact biotechnological products developed for agriculture. Broad agreement exists among participating countries to strengthen rules requiring that health-related regulations which impact trade be based on sound scientific evidence.

Three international organizations have been named to supply scientific expertise to GATT in settling trade conflicts: the Codex Alimentarius for food standards, the International Plant Protection Con-

vention for plant health, and the International Office of Epizootics for animal health. FAS's work for reliance on accepted international standards will facilitate the harmonization of standards among countries and minimize the use of illegitimate health regulations as a means to block imports.

- For additional information contact the FAS Information Division, Room 5074-South, Washington, DC 20250-1000; or phone 202-447-7115.



The National Agricultural Library

The Biotechnology Information Center (BIC) is one of 15 subject-oriented information centers housed at the National Agricultural Library (NAL) in Beltsville, Maryland. The NAL is one of three national libraries in the United States and has holdings of over 2 million volumes and over 26,000 periodicals relevant to agriculture. BIC provides access to a variety of information services and publications covering many aspects of biotechnology. The center can help patrons locate information on such topics as risk assessment, genetically engineered organisms used in the food industry, genetic engineering techniques used to control disease in plants and animals, and legislation related to the regulation of genetically engineered organisms.

BIC staff are familiar with concepts and techniques used in biotechnology and can guide library users in securing biotechnology information for business, research, and study. You may use the library in person, by letter, or by phone. The staff will assist you in accessing NAL's extensive collec-

tion on agricultural biotechnology subjects, refer you to organizations or experts in the field who can provide you with additional information, identify current biotechnology research conducted by USDA research agencies, perform brief, complimentary searches of the AGRICOLA database on specific biotechnology topics of your choice, or do a more comprehensive search on a cost-recovery basis.

If you need to obtain a copy of an article, a microform, or a book, document-delivery services are available through the lending branch at NAL. These services include interlibrary loan through other institutions or public libraries, photocopying of journal articles from AGRICOLA citations, locating of books or journals that are not found in the NAL holdings, or copying of microfilms such as the biotechnology database Telegen microfiche.

- For more information contact BIC, NAL, Room 1402 Beltsville, MD 20705; or phone 301-344-3218.

The National Agricultural Library in Beltsville, MD houses the Biotechnology Information Center.



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